REMARKS/ARGUMENTS

In the Office action dated February 24, 2005, claims 1 - 21 were rejected under 35 U.S.C. § 103. By this Amendment, Applicant has amended the sole independent claim, claim 1. Reconsideration and reexamination are hereby requested for claims 1 - 21 that are pending in this application.

Response to the 35 U.S.C. § 103 Rejection of the Claims

Claims 1 - 4 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Sakuma et al., U.S. Patent No. 6,766,038 (hereafter referred to as "Sakuma"), in view of Ramakesavan, U.S. Patent No. 6,184,781 (hereafter referred to as "Ramakesavan"). Claims 5 - 10 and 21 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Sakuma and Ramakesavan as applied to claim 1 and further in view of Saneyoshi, U.S. Patent No. 5,307,136. Claims 11 - 20 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Sakuma and Ramakesavan as applied to claim 1 and further in view of Minowa, U.S. Patent No. 6,385,529. Claim 1 is independent. Claims 2 - 21 depend on claim 1.

Sakuma discloses an apparatus for determining a relative speed of a vehicle, for determining a length of a vehicle and for recognizing a shape pattern of a vehicle. Here, either the vehicle moves relative to a stationary object having cameras mounted thereon (Figure 7) or a vehicle having cameras mounted thereon moves relative to a stationary vehicle (Figure 2).

Sakuma incorporates a pair of line scan cameras mounted on a stationary component (Figure 7) or a moving vehicle (Figure

2). The line scan cameras are oriented such that a thin and tall image is generated by each line scan camera. See the framed image 503 having frame width 505 in Figure 5. Sakuma teaches at column 5, lines 48 - 61 and column 6, lines 50 - 59 that the frame width needs to be "about 10~20 lines" because "if there are too many lines, not only will computation time for obtaining the correlation coefficient or difference values increase, but the changes in the threshold value or difference values become insensitive and the precision for correlation decreases."

Sakuma uses a correlation process to calculate speed and length and to recognize a shape pattern. Sakuma's correlation process is described at column 6, lines 3 - line 49. Sakuma measures vehicle speed by correlating the two framed images 503 and 504 and measuring the respective time displacement 506 between the two framed images. See column 5, line 62 - column 6, lines 3. The length information may then be obtained from the calculated speed. See column 9, lines 40 - 47 and Figure 9, blocks 903 and 904. Sakuma uses correlation to compare the image from the cameras with a template for a specific shape pattern (e.g., a wheel or a license plate). See column 7, lines 11 - 23, lines 40 - 44 and lines 63 - 65.

Ramakesavan discloses an imaging system that is used to provide a view behind a vehicle. Here, three different cameras are provided, each with a different field of view. The images from each camera are then combined to make a composite image that is displayed on a display device provided in place of the in-cabin rear view mirror. See the Abstract and Figures 1 and

3. Signals from the cameras may be provided to "a scaling unit 66 that scales the resolution of the captured frame, if desired, and a compression unit 66 to compress the size of the frame that is transmitted over a communication link 15." Column 9, lines 37 - 40.

Applicant respectfully submits that independent claim 1 is not obvious in view of the cited references. First, the asserted combination does not teach or suggest the specific limitations of claim 1. Second, one skilled in the art would not have been motivated to combine Sakuma and Ramakesavan.

Even assuming that there was a motivation to combine these references (which as discussed below there is none), the combination does not teach or suggest all of the limitations of claim 1.

The Examiner states that Sakuma discloses "a target detecting unit that detects both ends of the target in each of the left image and the right image (column 7, lines 49 - 58), based on gradations of pixels in the images that have been compressed in at least a lateral direction (column 5, lines 11 - 15)."

The passage at column 7 discusses a correlation-based template matching operation. Here, the collected image is compared to a template of a wheel shape. This passage says nothing regarding "detect both ends of the target."

The passage at column 5 refers to the line scan cameras. As shown in Figure 5, these cameras have a limited frame width which may result in a limited field of view. However, limiting

the field of view merely involves ignoring the rest of the view. This does not involve compression of an image as claimed.

The Examiner states that Ramakesavan discloses "an image compressing unit that compresses an image in at least a lateral direction (fig. 11 element 66 and column 2, lines 18-22), for each of a left image and a right image that are input after the images are picked up simultaneously with the cameras (column 1, lines 62-66."

Claim 1 has been amended as set forth above to recite that the image is compressed "to such an extent that vertical components at both ends of a target in the image are emphasized." This aspect of claim 1 is not taught or suggested by any of the cited references.

Through the use of this feature a system constructed or a method practiced according to claim 1 may be able to achieve more effective target recognition. For example, as shown in Figure 5, this feature may be advantageously used when a vehicle has a more rounded cross-sectional shape.

In view of the above, Applicant submits that the cited references considered either independently or in combination do not teach or suggest all of the limitations of claim 1.

Moreover, one skilled in the art would not have been motivated to combine Sakuma and Ramakesavan. Initially, Applicant notes that the references are directed to solving different problems. Sakuma is directed to a computer-based automated process that determines a relative speed, length or shape of a vehicle. In contrast, Ramakesavan is directed to a rear-view imaging system used by a driver of a vehicle. Given

that these references are directed to solving entirely different problems, one skilled in the art looking to solve one of these problems would not have been motivated to look to the other reference for help in solving the problem.

The Examiner states at page 3 of the Office action that it would have been obvious to combine the references because this would "enable an operator to be advised about hazards to the sides and rear of a vehicle." However, Sakuma is directed to an automated computer-based system. There is no reason to incorporate a display system for drivers into an automated system that does not involve human operators.

Applicant notes the absence of a reference to human operators of the vehicles in Sakuma. Moreover, the Background of Sakuma refers to related art involving traffic flow measurements. Column 1, lines 14 - 29. Also, in the examples described in Sakuma either the vehicle or the camera carrier is stationary. It is thus apparent that Sakuma relates to an automated traffic monitoring device and is not concerned with collisions between moving vehicles.

Moreover, a combination of the teachings of these references would not provide an improved system. Ramakesavan is trying to avoid collisions by providing a wider and more comprehensive field of view to the driver. However, Sakuma explicitly states that a wide field of view is undesirable (keep the frame width at 10~20 pixels) since this would undermine the ability to perform the correlation operation on the images. Hence, combining the camera system of Ramakesavan with the

camera system of Sakuma would provide a less effective, not more effective system.

Similarly, there is no teaching in the art that compression of pixel data as taught by Ramakesavan would have a beneficial effect on the correlation operations required by Sakuma. On the contrary, compression would alter the very data being relied on by Sakuma to make an accurate correlation between different images. Hence, it appears that the asserted combination would be less, not more, effective.

In view of the above, Applicant submits that claim 1 is not obvious in view of the cited references. Claims 2 - 21 that depend on claim 1 also are patentable over the cited references for the reasons set forth above. In addition, these dependent claims are patentable over the cited references for the additional limitations that these claims contain.

For example, claim 2 recites that "the image compressing unit compresses the images only a lateral direction." Ramakesavan does not compress an image in only a lateral direction. The image compression unit 68 shown in Figure 11 of Ramakesavan is, as explained in column 9, lines 29–41, for compressing the size of the captured frame, whose resolution is scaled by a scaling unit 66, which is then transmitted over the communication link 15 through a bus interface 70. Ramakesavan's reference to a "frame" means that he is dealing with an image that has a lateral direction and a vertical direction. Accordingly, scaling the frame as taught by Ramakesavan means that the lateral and vertical directions of the frame are both scaled. Ramakesavan provides no teaching or suggestion that it

may be advantageous to only compress the lateral direction of a frame. Similarly, Ramakesavan provides no teaching or suggestion that the image taken by the camera may advantageously be compressed only in a lateral direction.

Claim 3 recites that "the image compressing unit compresses the images in a lateral direction, and also compresses the images in a vertical direction at a smaller compression rate than a compression rate of the images in a lateral direction." The cited references do not teach the claimed compression. As discussed above, Sakuma does not involve compression. In addition, Ramakesavan merely states at column 9 that the frames may be compressed. Ramakesavan says nothing about how the frames are compressed.

The Examiner cites Ramakesavan at column 4, lines 43 - 51 as teaching this limitation. This passage does not, however, deal with compression. Rather, for each pixel, Ramakesavan is subtracting the pixel values of adjacent pixels (P(x-1, y) - P(x+1, y) and P(x, y-1) - P(x, y+1)) to "determine if the selected correlation area is a high-feature (or feature rich) area." No manipulation of the actual image is performed here.

CONCLUSION

In view of the above amendments and remarks Applicant submits that the claims are patentably distinct over the cited references and that all the objections/rejections to the claims have been overcome. Reconsideration and reexamination of the above application is requested.

Respectfully submitted,
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